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The Conservation of Moisture in the Soil.

ONE of the best-known facts in vegetable physiology is that living plants are made up largely of water, and that cultivated crops need an enormous amount of it for their development. Succulent fruits and vegetables, like Melons, Lettuce and Asparagus, when analyzed show as much as ninety-five per cent. of water. Root crops, like Beets and Carrots, may contain as much as ninety per cent. Grass and grain contain more than eighty per cent., and when at the blossoming stage as much as seventy per cent., and even the mature leaves of trees, and often the entire trees, are considerably more than half water. Of course, the cells and cell-walls of living plants must be kept in this moist, half-liquid condition to carry on their life processes, and since the water which is continually transpired through the leaves must be steadily replaced by fresh supplies drawn up through the roots, a plant in the course of its growth must take up many times its weight of water from the soil. Experiments in Prussia have demonstrated that for every ton of dry matter in an average crop of barley the plants exhale during their growth 310 tons of water; at the Cornell Experiment Station one ton of dry matter in a crop of oats represented an expenditure of 522 tons of water, and about the same proportion was needed in Wisconsin, according to observations in the experiment station of that state. In all these cases it is probable that better crops would have required more water, and since many different investigations have shown that the rain which falls upon a crop during its growth is not sufficient to support it, one can readily realize the importance of securing as much as possible of what falls during the entire year and of preserving it for use when the plants need it. When it is remembered, too, that all the ash ingredients—that is, the matter left after combustion—as well as other important elements, are taken up in a highly diluted form by the roots, which means that the fertility of the soil depends largely upon moisture, the furnishing of crops with the proper amount of water at the proper time may be considered as the fundamental problem of agriculture and horticulture.

Where irrigation is not habitually practiced, as is the case in most regions which are not classed as arid, it would seem that the first essential of successful tillage would be to prepare the soil to receive and hold as much water as possible. This means in many cases deep plowing, in all cases thorough pulverization of the soil and not a mere turning over of the surface. In his book on The Soil, Professor King says: "Since each independent grain of a moist soil is more or less completely surrounded by a film of water it is evident that the largest aggregate surface area may retain the most water per cubic foot. Now, a cubic foot of marbles one inch in diameter possesses an aggregate surface of 37.7 square feet, while if the marbles were reduced in diameter to one-thousandth of an inch, the total area per cubic foot is increased to 37.700 square feet," which means that a lumpy soil with large particles will absorb much less water than if it were made fine, and it means also that its power of retaining the moisture is reduced as well as its power of absorbing it. The breaking up of the soil and subsoil in autumn is therefore indicated as a means of checking the loss of water during the winter and spring by the drainage over the surface of rains and melted snows. When the soil is in good mechanical condition, if a crop is kept growing on it in the winter, the plants help to bind it and save the soluble plant-food which can be turned under in the spring. This also increases the humus in the soil, which adds to its capacity for holding water, besides supplying a storehouse for nitrogen.

But after all possible water is collected the problem of preserving it still remains. A soil which is in the best condition to hold the water which falls from the clouds is also in condition to draw up by capillary movement the stores of water from the deep permanent supplies of ground-water. Professor Johnson has illustrated the need of a soil made mellow and porous by tillage by comparing it with the strands of a wick in a lamp which neither fit too tightly nor too loosely in the socket; in other words, there is a certain degree of porosity which lifts the most water from below to supply what is exhaled by plants or evaporated from the surface. Some kind of mulching is essential to check this evaporation, and, as we have often explained (see, for example, vol. vi., pages 281, 411), shallow tillage acts as a mulch and is the most practicable way of providing it. Some interesting experiments which have been made by Professor Card in the University of Nebraska show that a mulch of coarse manure is better than surface tillage, but this is too expensive to use on a large scale. His experiments also showed that lightly stirred soil provided a mulch which was nearly as effective. The accepted theory is, that the water which is drawn by capillary attraction through a compact, though porous, soil to the surface evaporates there and passes away, while if this surface is broken and thoroughly worked to a depth of a couple of inches, the continuous pores are interrupted and the loosened earth, spread like a blanket over the compacted soil below, checks the rise of moisture and its dissipation in vapor. The result is that the water which would otherwise be wasted is put to use. Since its escape from the surface is prevented, it is forced to pass through the plant and do its work before it is transpired from the leaves. This is not an unsupported theory, and we have, time and again, quoted the experience of farmers, horticulturists and fruit growers (see, for example, vol. vii., page 56) to show that fruit and garden crops keep on growing through a drought under shallow tillage when uncultivated crops are at a standstill.

Now, there is nothing new in all this, and yet every year thousands of dollars are lost by neglecting these plain teachings. Of course, besides the considerations we have mentioned, there are others to be taken into account, such as underdraining, tree belts to check the sweep of drying winds, etc., but tillage is the prime factor, and we endorse thoroughly the conclusion of a bulletin lately issued by the Cornell Experiment Station, in which Mr. L. A. Clinton, the Assistant Agriculturist, says: "The importance of thorough tillage to conserve moisture cannot be made too emphatic. Deficiency in rainfall, with intensified agricul-

ture, is preferable to abundant rains and neglect by the cultivator. The soil will respond in a large measure according to the treatment it receives. Neglect it, and it will fail to bring forth liberal increase, but cultivate intelligently and thoroughly, and it responds quickly." The bulletin to which we allude is entitled "The Moisture of the Soil and its Conservation," and the whole subject is treated in a concise, but satisfactory, way. It is stated, to begin with, that the average rainfall during the year in New York is sufficient for the growth of crops, but, owing to its unequal distribution through the year, nearly one-half of it is lost by surface drainage, and crops usually suffer from drought. How to use the plow and the harrow, the cultivator and the roller so as to prepare the soil to receive and enable it to retain the moisture needed for the feeding and upbuilding of crops is made clear, and farmers are instructed how to sample the soil and determine the amount of moisture at different depths, and in this way to ascertain for themselves, by comparison between cultivated and uncultivated land, how much they can add to the producing power of their farms. We can think of no more interesting and instructive tests than these, not only for the individual farmer, but for granges and horticultural societies. Hardly a year passes in which some crop, early or late, is not diminished by drought to one-half, one-quarter, or a still smaller fraction of what it should have been. No matter how rich the soil, how pure the seed, or how careful the initial preparations have been made, a deficiency of moisture means failure and loss. How the farmer and gardener can have a reasonable assurance against a great deal of this loss has rarely been set forth more succinctly and clearly than in this bulletin, No. 120, and we commend it to the study of every progressive cultivator.

Roadsides in Autumn.

THE singular beauty of the wild growth that takes possession of undisturbed waysides makes one of the great pleasures of driving in the hill towns and more out-of-the-way portions of this and every country region. These roadsides are in many cases steep banks of considerable height; in others they are rough, rocky or wet; but Nature, by her inexhaustible magic, drapes and garnishes them with a lavish and ever-changeful grace and splendor. When the road-makers, in a spasm of zeal for "cleaning up," cut and slash along the highway, reducing this tangle of loveliness to heaps of slowly withering "brush" and a scarred and stony bed, it is enough to bring tears to the eyes of the discerning. In the spring or early summer this is not an infrequent catastrophe along the course of some favorite drives. But in the autumn, even those borders where devastation was wrought in spring have become beautiful again. Already they are softly clad in a wide mantle rich with Golden-rod, Asters and innumerable clumps of green or blanching Ferns.

But it is the fortunate by-roads that remained unmolested which now ripen their free harvests of intense color. Festooned from tree to tree, or hanging in massive luxuriance upon natural arbors of woody thickets, the wild Grape has ripened its abundant clusters; here they hang, dark in the shade and lucent in the sun, red and purple-black and greenish, opaline white. The Stag-horn Sumach, always picturesque and vigorous in form and expression, is now at its culmination of color, a splendid object. Not its crimson velvet horns alone, but the whole shrub brightens the wayside copse like a blaze, for there is no early autumn color in the whole breadth of the woodlands more vivid than these flame-like leaflets, in which the color has all the subtle play of that which lights the hearth in the autumnal twilight. If we are tempted by the greed of possession, it is easy to gather an armful of the long, decorative compound leaves, in which every one is a study and each unlike all the rest. But they soon curl and lose their beauty in the house; they belong to the brilliant, bracing air of the wayside. Other spoils there are, less perishable, which lend to indoor walls a certain sumptuous, yet sober, adornment, worthy of the season. Such is the Bitter-sweet, its bright scarlet fruits now beginning to gleam within the parted orange calyx. The woody vine in its complicated involutions often becomes a marvel of web-like, yet solid, structure, and makes a noble piece of decoration, mounted with all its clusters in its native order. The feathery seed-puffs of the white Clematis combine with it harmoniously, and these two are among the best home-adornments to be ravished from the wayside copses. Another bright berry that makes gay the moist places just now is the Black Alder, or Winterberry, our best northern substitute for the Holly. Its bright red berries are quite permanent when dried in the house, and sure to justify one of its local names—the Christmas-berry. The common Barberry, too, is now a jeweled bush in favored localities in the Connecticut valley, where it is as much at home as any native shrub. Its thickly hung, drooping racemes of bright fruit hold tenaciously to the stem, and make a charming ornament, even when somewhat wrinkled and spent.

Nor is it the grand masses alone, or even chiefly, with which Nature feels our joy in her, but the ever-changing mystery and surprise of her wonderful and exquisite variety. All the splendor of autumn rests upon some modest bit of perfection that meets the eye with an unexpected charm; it may be only

> The creamy elder mellowed into wine,
> The russet hip that was the pink-white rose.

Even the lowly carpet of her most secluded haunts is enameled with the Partridge-berry and the fruit of the Wintergreen, the richest scarlet against the deepest green. Everywhere a splendor set in harmony with that inimitable grace and fitness which is at once the highest teaching and the despair of our puny gardening. No artist-planned and labor-cultured plantations and shrubberies can rival the splendid simplicity of Nature on her own domain.

Along the by-roads the quaint, ruffled husks of the hazel-nuts are now parted to show the ripe, brown nut within. The bushes abound along these Hampshire County hillsides, and the harvest they bear is heavy enough to be hardly less precious to the squirrel than are the chestnuts, which now begin to drop from their burrs. The Hazel takes on a rich, tawny olive at this season, one of those fine ground colors upon which the thousand brighter dyes are so effectively displayed. A few weeks more and the bright golden flowers of that distant cousin, the Witch-hazel, will be left to shine alone, almost the sole witness to Nature's splendor, amid the brown and leafless thickets.

Amherst, Mass. *D. H. R. Goodale.*

Product of White Pine per Acre.

IN criticising certain statements of mine, Mr. B. E. Fernow says (see Garden and Forest, page 202 of the current volume): "One of the elements that needs to be known in order to discuss the profitableness of forestry is the amount of useful wood which can be produced per acre. On this point the most erroneous and extravagant notions exist, and many calculations are made on paper which can never be realized. The rate of growth of a tree at a given age is supposed to continue indefinitely, and this rate is applied to an acre of trees, . . . and thus we can compute astonishing yields for the future."

To this statement I fully agree, and, as a practical manufacturer of lumber, I have little patience with persons without any practical knowledge of manufacturing lumber, who measure a few trees, or employ agents to do so, figure out on paper the results of their measurements, and then rush into print with their figures to controvert the statements of men who have cut many measured acres of trees, who have had the logs measured, sawed into boards, the boards surveyed, and then make an accurate report of their experience.

For many years I was engaged in buying large quantities of Pine-trees, and, as was the custom at that time, I bought them on the stump, in many cases by the acre. It was my practice to hire the logs drawn to the mill by the cord of 128 cubic

feet; each load was measured by a surveyor; thus I was able to get at positive results not confined to a single measurement, but of numerous measurements.

It may be of some interest to Mr. Fernow to know that 128 cubic feet of logs, measuring from seven to fifteen inches in diameter (a fair proportion of each as they usually average), will make 1,000 feet of five-eighth-inch box-boards (surface measurement), and that I have frequently got 60,000 feet from an acre of land, the trees being not over thirty-five years old.

Mr. Charles H. Dwelley, of Hanover, Massachusetts, who for many years was engaged in buying Pine-trees by the acre, and having the logs and boards surveyed in the same way as was my custom, writes me, in acknowledging the reception of my paper, that I have understated the growth per acre, but he agrees with me on the amount required to make 1,000 feet of box-boards, for he stated that it would take 128 cubic feet of logs seven to fifteen inches in diameter to make 1,000 of box-boards. Mr. Dwelley also stated that he cut from two measured acres enough logs of fifty years' growth to make 200,000 feet of box-boards.

The measurements of trees which I made recently were to satisfy myself as to the number of trees that could be grown on an acre, if there were no open spaces, and learn their diameter at two feet from the ground when thirty-five years old; it was not for the purpose of ascertaining what naturally grows on an acre.

It is fair to presume that Mr. Fernow has had large experience in cutting and sawing lumber. His work may have been in that portion of this or some other country where lumber on the stump was of but little value, and where sawmills were constructed for speed rather than for economy, as they are in Plymouth County, Massachusetts. A very large circular saw, with teeth set by one who has no thought of economy, would, no doubt, waste in sawdust enough to bring the quantity of lumber, per cubic foot, down to Mr. Fernow's statement. It should be remembered that my statements were confined to Massachusetts, and particularly to Plymouth County, where I find Pine timber grows very rapidly.

Having had a sawmill in Franklin County, Massachusetts, and having sawed Pine-trees into lumber from many acres there, I found that the growth was very much less per acre, and not nearly as rapid, judging from the growth of the sections between the links. While Pines in Plymouth County frequently grow three feet in a year, those I cut in Franklin County rarely showed a growth of more than eighteen inches. As I worked only two seasons in Franklin County I do not feel that I know enough about the average quantity of lumber per acre, or the age for cutting it, to make any positive statements; but my impression is that sixty years would not secure a larger growth there than might be obtained in thirty-five years in Plymouth County.

It must be evident to every observing person who has traveled much, that the growth of the White Pine varies in different sections of our country so much that he who attempts to get an accurate average of the whole country will find that he has undertaken an impossible task. By cutting the trees on a measured acre, sawing them into boards and measuring the boards, we know the exact product of the acre, but we can get no positive knowledge of what an acre of standing trees will produce by any measurements we may make.

Hingham, Mass. *Edmund Hersey.*

Foreign Correspondence.

London Letter.

Gladiolus Nanceianus.—This comparatively new race is attracting considerable attention among English cultivators, several of whom have taken up their cultivation and improvement with excellent results. Messrs. Veitch lately exhibited and obtained certificates for a batch of new varieties which were remarkable for the large size and extraordinary coloration of the flowers. I believe this and Gladiolus Childsii are practically the same; at any rate, they had, according to Herr Max Leichtlin, the raiser of both, the same origin, namely, a cross between G. Saundersii and some of the varieties of G. Lemoinei. The flowers of some of the most recent seedlings are six inches across, and in color some of them verge on blue or violet. I have not heard much of G. Childsii lately, but I know that a year or two ago an American wholesale bulb grower took this race in hand and intended to grow large quantities of the best varieties. English horticulturists are planting them largely, thanks chiefly to Monsieur Lemoine, of Nancy, who holds a large stock of the best varieties.

Cyrtanthus hybridus.—This beautiful greenhouse plant was raised in the garden of Sir Trevor Lawrence in 1885 from Cyrtanthus sanguineus (Gastronema) and Vallota purpurea. It is not yet sufficiently plentiful to be well known, but it is a plant which is certain to find general favor, as, while possessing quite as much beauty as either of its parents, it is easy to cultivate. A single bulb planted three years ago in a shallow border close to the glass in a sunny greenhouse has yielded a dozen or so good flowering bulbs, which, grown in four-inch pots in a light frame, have flowered freely. The flowers are intermediate in shape between those of the Vallota and the Cyrtanthus, while in color they are pale scarlet. The Vallota is also flowering now. When properly grown this is a superb greenhouse plant, but it often disappoints cultivators by failing to flower. A thorough baking on a shelf in a sunny greenhouse during June, July and August is essential to its blooming. The white variety, of which we heard so much a year or two ago, turns out to be a pale, washy, red-flowered form, far less attractive than the type.

Acidanthera bicolor.—A first-class certificate was awarded to this plant last week by the Royal Horticultural Society, presumably because of its rarity, although it has been grown in the Cape house at Kew for the last six years and in gardens about New York (Garden and Forest, vol. i., p. 84) even longer. For the past month a bed of it in the open air at Kew has been gay with flowers, proving that under the same treatment as Gladioli it is a success. Grown in the mass it is really effective when in flower. In a bed close by is a batch of the newer Acidanthera œquinoctialis, introduced to Kew from Sierra Leone three years ago, and flowered in a greenhouse in December. Out-of-doors it is not a success, the growths being only half-finished by the middle of September, even in such a favorable summer as the past has been. It may be called a large edition of A. bicolor, the leaves being two feet long and two inches wide, the spike three and a half feet long and the flowers half as large again as those of A. bicolor; in color there is no appreciable difference between them. [Acidanthera bicolor thrives here also when grown out-of-doors in the same way as the ordinary garden forms of Gladiolus. Mr. Gerard lately brought to this office some of these flowers which were grown in this way. In grace of habit, purity of color and delightful fragrance they have few superiors.—Ed.]

Brunsvigias.—Only two of the ten species of this genus are known in cultivation, and these are both in flower now in the Cape house at Kew. They are Brunsvigia Josephinæ, which has a bulb six inches in diameter, leafless at the time of flowering, a scape eighteen inches long and a spreading candelabra-like umbel of flowers two feet through, the flowers three inches long, with reflexed, unequal segments colored bright brick-red. The second is B. gigantea, which has a scape a foot long, reddish flower-stalks as long as those of B. Josephinæ, the flowers smaller, paler in color and not so numerous. These plants grow in arid plains in south Africa, their bulbs buried often a foot below the surface, so that the umbels of flowers appear to rest upon the ground. Under cultivation, however, they require to be potted, so that the bulb is exposed to the ripening influence of sunlight and air, otherwise they will not flower. They should be kept in a sunny greenhouse or frame till the leaves fade, usually in May, and then exposure to sunlight and drought is essential till the flower-spike shows, which should occur in August.

Hymenocallis macrostephana.—Plants of this noble tropical bulb have been flowering freely this autumn in the Palm-house at Kew, where they thrive planted out in a border in a sunny position. It is as fine a plant in every way as its supposed parent, Hymenocallis speciosa, being quite as easily accommodated, growing rapidly and forming large tufts of strap-shaped leaves three feet long, and

producing annually sturdy scapes bearing large umbels of white flowers. These have a tube three inches long, elegantly curved segments of the same length, and a funnel-shaped cup two inches wide and long. They remain fresh several weeks and emit a powerful and delicious odor. The origin of this plant is obscure. It was first described in 1879 by Mr. Baker from plants grown in the Duke of Northumberland's garden at Syon House, where it is still grown in quantity for the supply of cut flowers. Mr. Baker surmises that it is the hybrid between H. speciosa and H. (Ismene) calathina, known to Dean Herbert early in the century.

Crinum Moorei and Agapanthus umbellatus are two of the most useful plants for the conservatory that we owe to the Cape. They are alike in their good-natured behavior under ordinary cultivation, forming large masses if grown on, and filling in a few years the largest pots or tubs. They do not object to being cramped at the root if supplied with manure-water when in growth, and they may be grown in cold latitudes in gardens where there is no glass accommodation, if placed in the open air during the summer and wintered in a dry shed. For placing in conspicuous positions on terraces or lawns or in corners where flowers are wanted to combine with architecture or statuary for summer effect they are of the greatest value. The Agapanthus is frequently grown for such purposes, but the Crinum is scarcely known in this character. Of course, large specimens are needed, but once obtained they are not easily lost. This year they have been exceptionally good with us, but I have been surprised by the number of inquiries as to the name and history of the Crinum.

Watsonia iridifolia Arderneil.—Messss. R. Wallace & Co., Colchester, have exhibited this plant at several flower shows lately, and it has won general admiration on account of its tall stems and large, numerous pure white flowers. Apparently it is identical with the white Watsonia introduced in 1889 by Mr. J. O'Brien and described by Mr. N. E. Brown as W. iridifolia O'Brieni. This plant has been grown annually out-of-doors at Kew since that time, where, in a bed in a sunny position, and when treated like Gladioli, it develops branched spikes three or four feet high bearing numerous flowers with a tube two inches long and a spreading regular limb of oblong segments nearly an inch long. The plant, however, appears to have failed to attract the attention of horticulturists until now. Messrs. Wallace offer the bulbs of it at thirty-six shillings a dozen and describe and prescribe for it as follows:

> This grand new bulbous plant, which in habit much resembles a Gladiolus, throws up strong branching flower-stems three to four feet high, carrying from fifty to one hundred flowers, which are of the purest white and of fine size and shape, much resembling a gigantic white Freesia. It is a lovely plant, and one we have every confidence in recommending. It is best started in a greenhouse in April and then planted out in June, though in warm districts it may be planted outside, or may be treated as a greenhouse plant entirely. After flowering, the bulbs should be lifted, thoroughly rested and dried off and kept free from frost.

London. *W. Watson.*

New or Little-known Plants.

Diervilla Japonica.

During a journey which I made in northern and central Japan in the summer and autumn of 1892 I tried to obtain some information of the wild types of Diervilla from which the numerous garden forms are derived, gathering specimens and seeds of the wild plants I encountered from the Hakone Mountains, on the south, to Sapparo, in the island of Yezo, at the north. Plants raised from these seeds have flowered this summer in the Arnold Arboretum, and the illustration of the flowering branch, on page 405 of this issue, is made from one of these plants. The fruiting branch is from a wild plant.

In central and northern Japan, Diervilla is a common shrub on the borders of mountain woods and by the banks of mountain streams, where it frequently grows fifteen feet high and from ten to twenty feet through, with numerous stout branches. It has ovate, acute or acuminate leaves, which are nearly glabrous, with the exception of a few hairs on the lower surface of the midribs and veins, or on some individuals these are clothed more or less thickly with soft pale pubescence. The flowers are borne in few or many-flowered clusters, which are long-stalked, or nearly sessile, the two forms appearing on the same plant, and they are rose-color, pale yellow, dark red or nearly white on the same branch or on different branches of the same plant, and flowers, which are pale when they open, often become rose-color in fading. I am satisfied that I only saw one species in Japan, and, in spite of the judgment of Maximowicz (*Mél. Biol.*, xii., 484), who had much better opportunities for studying these plants in Japan than I had, I am inclined to agree with Franchet (Franchet & Savatier, *Enum. Pl. Jap.*, i., 205) that Diervilla Japonica, Diervilla grandiflora and Diervilla floribunda must be reduced to a single species which is widely scattered through all the mountain districts of Japan, and varies in size, in the amount of the pubescence on the lower surface of the leaves, in the number of flowers and in the length of the peduncles of the flower-clusters. Diervilla Japonica of Thunberg appears to be the name for this species.

C. S. S.

Cultural Department.

Asiatic Cantaloupes.

We have a large extent of country where this fruit can be cultivated, and some of our soils and climates are better adapted to their growth than others. This year has been almost a fatal one in much of New Jersey by reason of the drought and insects. Delaware has done better, and Maryland has furnished a fair crop. Degeneration of a variety takes place in some localities much sooner than in others, and all imported seeds become smaller and of a light yellow. Some oriental seeds are dark-colored and quite large, particularly of the large varieties; but they at once become yellow and smaller, and in a few years are of the size obtained from our smaller melons, so that they cannot be told apart. All Turkish and Russian cantaloupe-seeds are large; some are gray, others are very dark yellow, and others again, bright yellow. Turkish seeds degenerate in size in Turkey, but not as they do here even in a single season. Our seeds are nearly all light yellow. I have once seen a bright yellow seed, and once a brown seed, but the latter when planted here became light yellow. It came from Louisiana, and produced an Acme.

Oriental cantaloupes are generally green-fleshed, well netted, and grow readily here, except those of Russia, from Odessa, where they are said to be abundant, cheap and fine. Japanese Melons are a failure here, and have very tiny seeds and no netting. In size the best oriental melons vary very much; some weigh a pound, others twenty-five pounds. The best come from Armenia, Persia, and Turkey in Asia. They are round, oval, very long (fifteen to twenty-five inches) and drupe-shaped. We have had in our country four varieties from Armenia, fourteen from Persia and six from Turkey in Asia. Five have not been tried yet.

The Cassabah (accent on the bah) is not a Persian Melon, as nearly all of the seedsmen have it in their annuals, but originated in a town of the same name north-east of Smyrna. In some of the English maps it is spelled Kassaba, but my spelling came from a native of Smyrna, where the fruit is sold. This Melon came to our country more than twenty years ago, and is still grown, though it has degenerated in most places. It is the parent on one side of many hybrids, conspicuous among which was the Bayview, which appears to have run out. The original Melon was grown in 1896 in Cape May County, New Jersey, and three fruits weighed together more than thirty-seven pounds. In Turkey it grows fifteen inches long and weighs as many or more pounds. It is densely netted, is generally flattened by its weight in growing and is pointed at the stem-end. The flesh is green, the fibre rather coarse and flavor very good. A new hybrid has appeared in Maryland that is a very showy melon—the handsomest large melon that I have cut in twenty years—weight, eight pounds; dimensions, nine inches by seven and three-quarters and seven and a quarter; densely netted all over (it was grown on

the end), green-fleshed and well flavored. Like all large melons, it had a conspicuous fibre. The way to grow the Cassabah is to keep some of the seeds of the first year until the variety degenerates or runs out, and then to plant some of the seeds to start the variety a second time. To save the seeds of a good cantaloupe precipitate them in water, pour off all the membrane and light seeds, rub the heavy seeds in a napkin and dry in the house. Preserve the seeds in a bottle and label carefully. Such seeds will germinate after a number of years. A good melon will yield 500 to 600 assorted seeds that ought all to grow.

The Taylor Cantaloupe of Persia was called after a Mr. Taylor who was many years in the State Department at Washington. He distributed the seeds, and the variety was grown for the market for more than thirty years. It was a large cylindrical melon, densely netted, golden when ripe, green-fleshed (sometimes butter-colored), good-flavored, and weighed up to twenty-five pounds. I obtained the seed of one that was nineteen inches long and weighed nineteen pounds. The variety had then been grown some twenty-five years. It appears to have quite run out, or to have degenerated materially. When of large size it was a conspicuous object on a dinner table. The soil of Washington seems to have been particularly adapted to its propagation. It soon degenerated in New Jersey where it was grown.

I have stated that this was a conspicuously poor year for Cantaloupes, and yet I had sent me the largest-seeded and finest hybrid melon I have ever seen—the handsomest large melon and the beau ideal of a green-fleshed melon. I have never seen as fine flesh in a melon six and a half inches long, although I have in fruits of half a pound in weight. This cantaloupe was egg-shaped and densely netted all over (it also grew on its end). It was ripe to the rind, which was grass-green in color, and had a wonderfully fine smell and taste. Such a growth would be a great acquisition to the horticulturist, provided the seed could be depended on to produce its kind. Unfortunately, the hybrid, which weighed seven and a half pounds and was one and three-quarter inches thick in the flesh, had a very large share of unfertilized seeds and was alone in its growth. The seed that produced it was from a Louisiana Acme, which yielded several hybrids. An attempt will be made by several growers to reproduce this distinctive round hybrid, which has stellate markings in its coarse netting. It is particularly conspicuous in its thick flesh all around, except at the stem end and its very small cavity.

Philadelphia, Pa. *Robert P. Harris.*

Fig. 53.—Diervilla Japonica.—See page 404.

Grapes under Glass.

PROBABLY the most common mistake in the cultivation of grapes grown indoors is overcropping, though in the case of private gardens the fault is not always that of the gardener. The employer requires a large crop, and, in consequence, the finish of the grapes must be sacrificed. Finish is the end that every good cultivator strives to attain. By good finish we mean perfect color, richness of bloom, large, well-formed berries and good flavor. The vines contain but a certain amount of vitality, and if compelled to carry an overcrop they will carry it only so far and stop before a proper finish has been attained. Liberal feeding will certainly assist, but grossly fed vines never produce properly finished grapes. It is impossible to lay down a hard-and-fast rule of how many bunches a vine ought to carry, as the varieties vary so much in vigor and in size of bunch. It is considered by some good authorities that one pound to every foot of fruiting vine is sufficient, but we find vines capable of carrying considerably more. Much, of course, depends on the age and condition of the vines. Considerable difference of opinion exists among grape growers as to the stage at which syringing should be withheld, but our experience is that finish is always best when syringing has been discontinued after the time of setting. Some argue that syringing is necessary up to the time of coloring to keep down thrip and red spider. We find that this practice is rather productive of spider, as it tends to weaken the foliage and leaves it more susceptible to the attacks of insect pests when syringing must necessarily be withheld. It also hurts the bloom of the grape in the early stages of its formation, a period when it is easily damaged. Should red spider appear it may be expedient to give an occasional thorough syringing to the infected parts. This is not so hurtful as continued sprinkling, for, if the bloom is fixed, it will shed the water from the berries, providing it does not strike with full force on the bunches. The syringing should only be done when plenty of air can be given, as the shorter time the water is allowed to remain on the bunches the better. Airing is probably the most important of all details, and is especially troublesome during the spring months. The increasing brightness of the sun on the one hand, and the cold air on the other, make it somewhat difficult to keep the house at the proper temperature and at the same time avoid cold draughts. As the season advances the extremes become less marked, but when the grapes are coloring and it is necessary to leave a little night air on, there is the greatest danger from mildew. We make it a practice with the span-roofed houses to leave the air always on the west side, as we find that mildew makes its appearance generally during the prevalence of easterly winds, and by leaving only the west side open the cold draught is somewhat avoided. Toward the end of the season, when the leaves have become harder in texture, they are less subject to the attacks of mildew, and more night air being required for the ripening of the wood, it can be given with more safety. But full night air should not be given until the fruit is cut.

Watering is another important point, and the amount must be controlled to a great extent by the mechanical composition of the soil of the borders. If of a loose, open nature the supply should be large; if close and retentive, a smaller amount is required. In either case, when the grapes begin to show color a good watering must be given, and watering should then be stopped. If the soil is loose and open, much benefit is derived from a mulching of hay inside the house. This serves not only to retain the moisture in the soil, but helps to keep the atmosphere of the house dry. It is often found necessary to give the borders a thorough watering after the crop has been cut, when there is danger of the roots being too severely dry.

Tarrytown, N. Y. *William Scott.*

Carnations, New and Old.

CARNATION growers in this vicinity have set their plants indoors for winter blooming. On the whole, the season has been unfavorable for Carnations in the open ground. August, when the plants usually make most of their growth, was very dry. Insect pests were numerous, and, despite the dry weather, fungoid diseases took such serious hold of several varieties that growers have hesitated to risk space for them indoors. Calculations are generally made in spring at planting-time for ample stock of the most desirable kinds, and it is likely to prove a serious loss to have to substitute less desirable kinds or surplus plants of other sorts for such as have failed. William Nicholson, of Framingham, Massachusetts, last season had a splendid lot of Eldorado, Shelmire's beautiful yellow of the Picotee type, which proved to be among the most valuable of fancy varieties. Unfortunately, the plants in the open were so badly affected with rust this season that he would not risk taking them in. Bacteriosis is affecting some varieties badly, notably the new Della Fox and Alaska. The latter variety was a complete success everywhere last winter. Some growers pronounce it the best white-flowered Carnation up to date, and have discarded some of the hitherto standard varieties in its favor. With bacteriosis so prevalent, it would have been better to have grown a good supply of Mrs. Fisher as a reserve. Carnations have proved decidedly local in their requirements, and but few are universally floriferous. The variety William Scott is a notable exception. William Nicholson grows the variety which bears his name, perfectly, and in the Boston market it has always been a great favorite, and brought high prices. But he is almost alone in this success. Mrs. Fisher, though nearly yielding to Alaska in popular favor, is again in the foreground. The veteran grower, Joseph Tailby, of Wellesley, considers that Mrs. Fisher would be the ideal white-flowered variety if the stem were a trifle better than it now is. Mr. Tailby is an experienced and successful raiser of seedling Carnations, and now has several new white varieties of his own raising on trial, which, although excellent, are not his ideal. A cross between Lizzie McGowan and Mrs. Fisher is a magnified Lizzie McGowan, a type which is not successfully grown in the neighborhood of Boston. The flower and stem are magnificent. Another is Daybreak × Mrs. Fisher, and nearly intermediate in character between the parent plants. Its defect, if any, is in showing a creamy centre. So indifferent have many new varieties proved (though probably locally successful) that growers have invested sparingly. Della Fox, the heavily tinted and so-called improved Daybreak, has been given a more extended trial than usual. Tailby & Son have a whole bench of it. As shown by the introducers, Myers & Santmann, of Philadelphia, it left nothing to be desired. The plants are, unfortunately, everywhere unhealthy. They are infested largely with bacterial disease, the most insidious and most difficult of all to eradicate. While we have no certain remedy as yet for these diseases, no grower need now be at a loss to know what ails his plants, thanks to the Carnation Society and their specialists. It is well known that spot, and, for that matter, all diseases of like character, increase rapidly when the soil is saturated with moisture, and, through imperfect drainage, does not dry out quickly. It is not economical to save coal when a little fire-heat, with plenty of ventilation, would keep the air moving and help to correct unfavorable conditions. It is better to have shallower benches and use water oftener, if need be. This is especially true on heavy soils. Cleanliness, above all things, is the best preventive of disease. It is hoped by all, and with good reason, that by attention to these details, as experience has shown in the case of Daybreak, Della Fox will come out free from disease as the season advances.

There have been fewer varieties of the distinctly maroon shade, of which Ferdinand Mangold is a good example, than of any other color. Ferdinand Mangold is so near the ideal that it is hard to improve upon it. Mr. Butterworth, grower for Mr. Powers, of South Framingham, has a good Carnation of this color on trial; but it is somehow peculiar in its needs, for even the originator has discarded it. It is exceptionally free and perfectly healthy, but not robust, and this is its weak point. The flowers are of good size, perfect in form, decided in color, fragrant, and the stem is ample and strong. Mr. Nicholson has a new crimson, which for size and beauty of form excels any I have seen. It is too early to decide what it will prove, but at present it appears too much set after the old border Clove Pink type. If it comes up to Mr. Nicholson's expectations, it will be named for Sir Henry Irving. A beautiful companion pink, William Scott × William Nicholson, will be named for Ellen Terry. This is a success beyond all question.

Mr. Tailby and Mr. Nicholson imported some plants of Uriah Pike, the invincible English crimson, which they saw in England. Though peerless in that country, neither grower expected it would succeed under American methods, nor was it in any way a success. Mr. Tailby's purpose was to use it as part parent in some new types. Ferdinand Mangold × Uriah Pike were his crosses, and out of 108 seedlings only four were single. All proved crimson, and, contrary to the rule which Mr. Tailby has almost invariably found to prevail, all the seedlings showed a marked preponderance of the character of the pollen parent. This was not desired, and only a better constitution was wanted. A dozen of the seedings have been taken indoors for trial, but probably only one will be found of especial merit. For this he has already received a tempting offer from a notable English firm, who are thinking of taking up the American plan of culture. The flower is per-

fect in form, magnificent in build and livelier in color-tone than the flowers of either parent. Its habit indicates that it will be sufficiently floriferous. Mr. Tailby is equally fortunate in the possession of a good scarlet, E. G. Hill × Florence. It is quite equal to Portia, and more robust in habit. To displace Portia it must have good staying qualities, for this standard old variety is as yet without a peer on the market in the matter of productiveness. William Scott still holds first place among rose-colored varieties now in cultivation for profit. But for one defect, a rather serious one for the retail florist, it would be perfect. Its rich pink tones quickly fade to purple, and this often happens before the retailer disposes of his stock. The old Grace Wilder, once the favorite, but now out of constitution, when at its best was equal, if not superior, to anything we have ever had. The flowers were salable as long as they remained fresh.

Donald Macrea, of Framingham, Massachusetts, has the white-flowered William Scott, which, if it holds true to the few flowers now open, promises to be an acquisition. Corsair, a fine crimson, also looks promising.

Wellesley, Mass. *T. D. Hatfield.*

Violet Culture in Pots.

THE growing of Violets in pots for winter flowering is not a new method, but it is not so extensively employed as its general utility deserves. Since adopting this system we have been enabled to produce blooms superior in size and color to any we ever had from plants grown on benches, and, what is of more importance, the plants have yearly increased in general vigor and exemption from disease. Being in a portable condition, they can be kept in pits or frames until Chrysanthemums and other fall-flowering plants are gone, and as by that time they will be well established in the pots and blooming freely, they will continue to do so in the greenhouse under proper cultural conditions.

The plants are set in the field to make their summer growth in rows eighteen inches apart each way; they are kept scrupulously free of weeds and useless runners. About the last of September the best plants are lifted and placed in well-drained seven, eight or nine inch pots, according to their size. On taking them up the soil is well shaken from the roots, as it is desirable to have as much fresh compost in the pots as possible in a lumpy state, and lightly firmed with the potting lath. When potted they are taken to the frames and are given a thorough watering, the sashes, lightly shaded, are put on, air is admitted freely day and night while mild weather continues. When dry they are watered, and they get an occasional syringing on bright, mild days and are covered with mats and shutters to exclude frost. All these details are carefully and persistently attended to until the plants are transferred to the greenhouse.

The Marie Louise is the principal variety used, and as an early and prolific bloomer is unequaled. The Farquhar, Lady H. Campbell and Swanley White are also grown, and it is worthy of mention that all these varieties, growing side by side and receiving identical culture from the cutting to their flowering state, are in a uniformly vigorous and healthy condition.

South Framingham, Mass. *A. McKay.*

Some Autumn Flowers.

Zinnia Haageana.—All the Zinnias bloom late into the season, but this species is superior to any of the common large-flowered kinds. It is of compact dwarf habit, each plant forming a little bush twelve inches in height, densely studded with its orange-yellow blossoms. It is not as coarse a plant as our ordinary Zinnias. The leaves are much smaller; the flowers are only an inch and a quarter in diameter, but they are very double, and make up in numbers what they lack in size. In many respects I prefer Z. Haageana to the less shapely kinds with larger blooms. It is decidedly one of the best of the late-flowering annuals, thriving satisfactorily in even the poorest kinds of garden soil.

Anemone Whirlwind.—No flowers are more useful than the Japanese Anemone, and in addition to the single forms of this plant, the variety with semi-double flowers has greatly added to their importance. Whirlwind is a semi-double form of the old white variety of Anemone Japonica, and although not more decorative than the older kinds as a garden plant, the cut flowers are more lasting. It is now showing its first blossoms, and with continued mild weather will provide flowers for cutting until the middle of November.

Clematis paniculata.—This now well-known plant is annually becoming more and more popular. It is generally grown as a trellis climber, and there is nothing to equal it for this use at this season. Its creamy white blossoms completely obscure the foliage, and they persist for weeks. I have lately seen the plant used with good effect in covering unsightly tracts of rubble and barren soil. The roots, of course, were well taken care of, the site and soil being specially prepared for them, and from the stems spread rapidly in all directions. The unearthed roots and stumps of old trees, piled in an oblong or irregular mound, make a picturesque groundwork for this and other climbers.

Caryopteris mastacanthus.—One must search a long time to find a more attractive little shrub at this time of year than this rare old Chinese plant. It is very dwarf and bushy, making a compact little mass from two to three feet high. The notched leaves are deep green on the upper surface, and whitish beneath. The small pale blue flowers are borne in conspicuous axillary clusters, and they are produced so freely that the plant is now a mass of bloom. There is, too, an indescribable daintiness and elegance about the arrangement of the stems and flowers. That so good a plant has escaped general attention for so many years is a mystery. It is now, in the last days of September, a perfect picture. To its charms it adds the merit of hardiness, and its cultural requirements are quite ordinary. Isolated on the lawn, or mixed with other dwarf plants in the shrubbery, it is alike effective.

Floral Park, N. Y. *M. Barker.*

Correspondence.

Additional Notes on Compass Plants.

To the Editor of Garden and Forest:

Sir,—It is evident from the statements of the note in Garden and Forest of August 19th about the usefulness of the leaves of the Compass Plant for determining in a general way the direction of a north and south line, that they would furnish no help to distinguish north from south. The plant would only be of use as a compass when the sun is hidden by clouds, for on a clear day the sun itself would be a better guide. When most needed the leaves might utterly fail in usefulness if a traveler lost his initial direction, which is very easy, and is readily increased by the well-known tendency of a bewildered person to move in a circular direction. Hence, he might soon be taking a direction directly opposite the one he wished to take. But there is another habit of the Compass Plant which might be used to correct this. Dr. Engelmann says in the article referred to in my former note: "The large flower-heads, on short and very thick peduncles, are almost invariably turned eastward." This is the only allusion I have seen to a habit which I have often observed and verified, nor have I any information that any use has been made of it in practice. A person standing on the east side of a field of Compass Plants and facing the west sees a mass of yellow before him; let him change to the west side, and the diminished intensity of color at once becomes apparent. When the plants are examined individually it is seen that nearly all of the flower-heads face him in the former case, and that the south is to the left hand. There is about the same reliability to be placed on this eastward turning of flower-heads as on the north and south trend of the leaves. It is quite general, but not definite in many cases of individual heads. Hence, during the floral stage of a Compass Plant, it is not difficult to distinguish north from south.

I have not been able to find a satisfactory reason for the curvature of the peduncles which turns the heads to the eastward. Light and gravity, resulting in heliotropism and geotropism, are now given as the main causes of such tendencies. Heliotropism, or the bending toward the direction of the incident rays of light, may be the primary cause here, but it does not explain why the turning is eastward rather than westward, unless we assume that the rays of the morning sun are more potent than those of the afternoon sun. The flowers, like the leaves, place themselves so that the largest surface is perpendicular to the direction of the longest continued light. A leaf with its surfaces in a vertical plane directed north and south is in an attitude to receive light more evenly on both sides throughout the day than leaves ordinarily placed with an upper and an under side, and there results from it in Compass Plants a more equal distribution of stomata on the two surfaces, so that, though structurally with ventral and dorsal surface, they are practically without it. Heliotropism is taken by Stahl and others to explain this leaf position.

The heads do not follow the sun. The short and thick peduncles, three-fourths of an inch to an inch and a half long, are too stiff to allow much daily turning. Nor is the eastward

bending due to the open flowers; it begins early and may be seen when the plant is in bud. Peduncles arising from the north and the south sides of the stem are found verging toward the east from the start, or they curve near the top so as to bring the bud into the position which will be taken by the head when expanded. Those springing from the east side are naturally in place to look eastward, the top of the peduncle curving over. Those on the west side are scarcely disturbed. It would be too great an effort and require too much force to turn them without coming in contact with the stem, and if heliotropism is the force they are in position to get the rays from the west. Three-fourths of the heads in a symmetrical plant are, therefore, normally in place to turn eastward more or less readily. Even less than the normal fourth are usually found on the west side of the axis of growth. The long continued effort of the plant to bring its leaves into the plane of the meridian seems to have resulted in a preponderance of leaves on the north and south sides of the stem, an approach to a two-ranked arrangement or flattening of the axis of growth, and as the peduncles spring from the axils of leaves and bracts there is the same tendency in the flower-heads. These vary in number from a single head at the top of the stem to twenty-five or thirty on a large, branching plant, from five to ten being the most common number. When they are crowded at the top of a stem or branch, or somewhat bunched in their arrangement, with less freedom for the curvature of the separate peduncles, the stem bearing the group usually curves to the eastward, the combined weight of the heads probably helping in the process. When the heads become old or reach the fruiting stage the peduncles in many cases straighten, and more of the heads when in fruit look upward.

The heliotropic force is more conspicuous in the flowers of the Prairie Dock, Silphium terebinthinaceum. The heads are smaller and lighter, on more slender peduncles two to five inches long. The stem is usually taller and generally provided with several slender, spreading branches, and is so free from leaves, except at the very base, as to be scape-like. The heads, as a whole, are turned to the east, but between the hours of ten and twelve the majority are plainly seen to face the south-east. The afternoon sun does not draw them any farther around, but they continue in their forenoon position, but look eastward in the morning. In this they manifest a slight tendency to follow the sun.

The twisting of the leaves and petioles of the two Silphiums and of the Prickly Lettuce to bring them into the meridional and vertical planes is spiral in its character. A stem-leaf with a horizontal base and a vertical tip, or upper half is spirally turned. The motion is with the sun, from left to right, or, to use the common illustration, with the hands of a clock. A leaf on the south side of the stem has its upper face turned to the west, one on the north side has it turned to the east, those inserted on the east and west sides are turned around more or less to the south and north, so as to bring their extremities into a position somewhat parallel with the former. This is quite easily discerned in the Prickly Lettuce, a much more leafy plant than the Silphium. The leaves of the Wild Lettuce, Lactuca Canadensis, frequently show the workings of this same force, the ends of the leaves being more or less spirally rolled from left to right as they are followed around the stem. A quarter of a turn serves to bring most of the leaves of these Compass Plants into the required position. Occasionally the petiole of a radical leaf may be turned through 270 degrees. Evidently the same force is at work here as in twining plants, which for a given species turns them in a definite direction, either with or from the sun.

My observations on these plants have been made on those growing in the open prairie, where they receive the full sunlight. If they stand by the borders of woods, or in partial shade, owing to interference with the light the results may be quite different, or not shown at all normally.

Chicago, Ill. *E. J. Hill.*

The New Ozark Iris.

To the Editor of Garden and Forest:

Sir,—During the past two years several articles have appeared in Garden and Forest relative to the new Iris found by me in the Ozark Mountains, and named by Mr. J. N. Gerard I. hexagona, var. La Mancei. All these articles have dwelt upon the beauty of the flower and its increase in point of size and intensity of color over the ordinary type of I. hexagona, itself a handsome and striking species.

I find that in other respects this new Iris departs far from the Hexagona type. It blooms ten days earlier and more profusely. I. hexagona, under our hot suns, ripens its seed-capsules by early midsummer, and the foliage dies down immediately after. Farther north this early dying down of the foliage, and consequent ripening of the rhizomes, may not be a characteristic of the plant, as Gray makes no reference to it, but here it is a noticeable feature. The variety, however, keeps green until autumn, the lower leaves alone dying in late summer.

There is a marked variation in the seed-capsules. In I. hexagona the seed-pod is oblong-cylindric, six-angled, two inches long. In the new plant the capsules are globular, one and one-eighth inches long, and but a sixteenth of an inch less in diameter. The seeds are a trifle smaller also, but of the same general shape and color.

Pineville, Mo. *Lora S. La Mance.*

Yarrow as a Lawn Plant.

To the Editor of Garden and Forest:

Sir,—In your issue of the 9th instant appears a note in regard to Achillea Millifolium as a lawn plant. The plant your correspondent refers to is, without doubt, the European variety, which seems to be quite distinct from the native form. It is not so rigid as our plant, and seems much better adapted for turfing. About ten years ago I noticed it growing on a steep, dry bank near the University buildings in Toronto, and making a very good ground cover where nothing else would grow, and I agree with your correspondent that it is a useful plant in such situations.

Botanic Garden, Buffalo, N. Y. *John F. Cowell.*

Utilizing Choke Cherries.

To the Editor of Garden and Forest:

Sir,—Mr. Waugh's letter, under the foregoing title, in your No. 448, may be confirmed by other experience than his own. It is years since New York summer residents of Vermont adventured to make jelly from choke cherries and found it to be delicious, and even of peculiar excellence.

The native Vermonters neglect or despise this wild fruit, but that is only fortunate for the people who wish to use it.

New York. *J. E. Learned.*

The Forest.

The Burma Teak Forests.—X.

Military Men Employed as Forest Officers.

A LATE article in Garden and Forest noticed the practice, when forest administration was first organized in India, of employing military officers. The work had to be done, and we could not wait until professionally trained men were available for it. Military officers, and in some cases medical men, were selected; young men of active habits and good constitution, good business capacity, sportsmen or botanists, with tastes which were likely to make them take kindly to solitary life, hard work and exposure in the forests. A number of the men thus selected have done eminent work in helping to build up forest administration in India. Colonel Pearson has the great merit of being the first to protect forests on a large scale and in a methodical manner against the ravages of jungle fires, and he did this, as he himself delights in acknowledging, not only against the powerful opposition of nearly everybody, natives as well as Europeans, but also against the strong misgivings of his own heart. For to interfere with this ancient institution which cleared the ground in the hot season of inconvenient grass and underwood seemed little short of impious interference with time-hallowed custom. But Colonel Pearson succeeded, and no one was more pleased than he himself to see the change which took place, as if by magic, in the forests thus protected. This was in 1864, and since that time fire conservancy is universally recognized as the most important part of forest protection. One-third of the total area of state forests in the British Indian Empire is now every year protected against the fires of the hot season. Another military officer who should here be mentioned is Colonel Bailey, of the Royal Engineers. In 1872 he organized the topographical survey of the forests, and afterward, when the necessity began to be recognized, of providing a large number of professionally trained native forest rangers; he established the forest school at Déhra Dún, and for many years filled the post of director of that institution, and of Conservator of the School Forests. To these names I might add many others of military officers who in the early days of forest administration in India have done excellent work. On this point I lay great stress in order to show that under certain circumstances, and under good professional

guidance, military officers may with great advantage be employed in forest work.

PROTECTION OF THE FORESTS.

For the protection of the forests, however, it would have been a serious mistake to employ a military force in India. The employment of troops as a police force for the protection of the Yellowstone Park and other Reservations in the United States, doubtless, is the right course to pursue in order to enforce efficient protection against timber thieves who would rob the forest, and herdsmen who would otherwise set fire to it, in order to produce better pasture for their sheep. Where public property and the vital interests of the nation must be protected against the selfish cupidity of individuals the rigid discipline and the stern action of the military force are necessary. In India matters were different. The ruling power, it is true, was always regarded as the proprietor of all waste and forest that had not been alienated, but the people living in the forests and in their vicinity had been in the habit, from time immemorial, to use the forest for their own requirements, to cut wood and bamboos, to graze their cattle, to clear and burn the trees for their shifting cultivation. When the work of demarcating state forests was commenced, the question arose, how this customary user of the forests should be dealt with. From the outset I insisted upon what I considered as the only just plan, namely, that the customary user should be regarded as a right, but as a right which the Government, as the guardian of the public interests, had power to regulate, to commute, and, by the grant of equitable compensation, in land or in money, to extinguish. This view of the case was accepted and embodied in the forest laws which were passed successively for different parts of the empire. But the provisions of these laws were enforced with due consideration for the habits and customs of the people, and the employment of a military forest police would have been a great mistake. In Burma and in other portions of the empire was it possible, by giving congenial and profitable employment to the inhabitants of the forests, to make them our allies, and to enlist their interest upon the side of forest protection, but this was not everywhere possible. The establishment, the efficient protection and the regular methodical management of the forests unavoidably interfered with the habits and prejudices of the people, and although just and equitable compensation was always liberally given, still the alteration of circumstances made itself felt. It is true that the area of reserved forests in the whole of the provinces under British administration amounts to only 7.5 per cent. of the total area, and that in most provinces the forests are situated on the hills, away from the open, densely inhabited country. But, nevertheless, their aggreagate area is very large, 71,600 square miles, or forty-six millions of acres. And as just related, from more than one-third of this area has it been possible to exclude fires. The demarcation of a reserved forest, its efficient protection, and particularly the prevention in it of the annual jungle fires, are measures which completely alter the aspect of the country and which unavoidably, in many respects, interfere with the old-established habits of the people. The small amount of dissatisfaction that has, fortunately, manifested itself among the people concerned, proves that the forest laws have been administered in a considerate spirit and with due regard to their habits and prejudices. And this could not possibly have been effected if the protection of the forests had been undertaken by a military force.

TEAK AND BAMBOOS.

Like the Oak and the Scotch Pine, the Teak-tree demands much light. As already mentioned, it does not, as a rule, form pure forests, and it thrives best where the ground is protected by a dense underwood of Bamboos, which forms a lower story of the forest thirty to sixty feet high. This underwood of Bamboos is analagous to the lower story, which the Beech, the Hornbeam and the Silver Fir in Germany form under the Oak or the Scotch Pine, and which, according to Pinchot and Graves, in Pennsylvania the Hemlock forms underneath the White Pine. The Bamboo, therefore, may be regarded as a useful companion, a friend and ally of the Teak-tree, but in young Teak plantations it often is a most formidable enemy. The forest cleared by the Karens for their toungyas, to a great extent, is composed of Bamboos. Each Bamboo clump consists of two portions. Underground is an entangled network of rhizomes, while above ground rises the gigantic tuft of hollow woody stems. The rhizome is not, as a rule, killed when the toungya is fired. During the first few years these rhizomes produce slender shoots, but gradually they recover their strength, and then all at once a number of stems grow up of the ordinary thickness, and at once attain their full height, which varies according to the species, Dendrocalamus, thirty to forty; Bambusa polymorpha, which is the species that prevails in the moister forests, from fifty to sixty feet. At that time the young Teak, if properly cared for, is extremely vigorous, the stems, fifteen to twenty feet high, on the current year's shoot, with four to five pairs of leaves two to three feet long and eight to ten inches broad. Weeds, seedlings and coppice-shoots of other trees no longer endanger its existence if the early cleanings have been carried out regularly, and the plantation seems safe. At that time, however, the Bamboo-shoots come up all at once in dense masses, the Teak is overtopped, a large proportion of the plants is killed, some linger with a few miserable leaves under the dense shade of the Bamboos, while others continue the struggle, but are mostly forced up into long, slender, weak stems. Here prompt and vigorous action is needed in cutting back the Bamboos. Obviously Teak plantations, particularly those established on toungyas in the heart of the forests, require constant care until the Teak has overtopped the Bamboos, which is not generally the case before it is fifteen to twenty years old. The Bamboos associated with Teak in the Burma forests have been compared to the companions of the Oak in Europe, and the White Pine in North America, to the Beech and the Hemlock. But the life-history of the Bamboo is very different. When the stems, which constitute the Bamboo clump, have attained a certain age they produce flowers, and after ripening their seed they die off, and in most species not only all stems of one clump, but all clumps in one district, bear seed and die. The dead stems fall and form a tangled mass of Bamboos, through which it is hardly possible to force one's way. The fires of the next hot season, however, sweep away this dry mass, and when the rains set in the enormous crop of Bamboo-seed germinates, and the result is a carpet of young slender Bamboo-plants, a portion of which, after a series of years, grow up into clumps. Hence, the flowering and seeding of the Bamboo is an event of great importance, which recurs after a certain number of years; thirty years in the case of some species, forty in the case of others. At that time, when the cover overhead is thus suddenly removed, the seeds of Teak and other trees which have not been destroyed by the conflagration get a chance and grow up.

Bonn, Germany. *Dietrich Brandis.*

Recent Publications.

The Nursery Book. Third Edition. Macmillan & Co., New York.

This is not merely a reprint of the manual which was issued some half-dozen years ago under this title, but it is a thorough revision of that work with much new matter, with many more illustrations, and with the nursery list expanded and brought down to date, so that it honestly fulfills the promise of its subtitle and is "A Complete Guide to the Multiplication of Plants." The chapter on Pollination, which was in the original book, is not found in this edition, but this leaves space for much other practical matter like the discussion of the question whether plants propagated by grafting are constitutionally weakened by this process. It ought to be said that the useful notes on pollination are not lost, but are now included in *Plant Breeding*, another book belonging to the series aptly named "The Garden Craft Series," which now includes, besides the two we have named, *The Horticulturists' Rule Book*, with the promise that others are in preparation. Altogether, *The Nursery Book* is in every way a helpful little volume which may be safely trusted by the novice as a guide to all ordinary manipulation which is required for the propagation of plants, and even the skilled propagator will find it convenient to have such a handy volume within reach for reference in matters where his memory is at fault, or in some particular where his experience is limited. In the popular language of this country the word nursery has come to mean an establishment for propagating trees and shrubs. It need hardly be said that this work is not so limited in its scope, but treats of the multiplication of all plants, whether woody or not, in every practicable way.

Notes.

Five houses of Messrs. Dailledouze Brothers are now filled with new crop Carnations, the houses measuring 125 to 200 feet in length. Flowers have been cut from these plants for

three weeks past. William Scott and Daybreak are the pink varieties now in season, the dependence for crimson and dark red being upon new seedlings. Lizzie McGowan is the only white sort being cut in these houses, and the variegated Helen Keller and Minnie Cook complete the list.

The Rural New Yorker praises the Japanese Ipomœas which have been sold for a few years past under the name Emperor Morning Glories, for the size and brilliancy of their flowers with their sharp color-contrasts of fiery red, blue-black, indigo, maroon, bronze and white. We have observed these vines covering a heap of old stumps and they proved very effective. It is to be hoped that they will not be as difficult weeds to get rid of as the old-fashioned Morning Glory, which itself, by the way, is one of the most beautiful of flowers.

The Beach Plum, Prunus maritima, is a desirable shrub or small tree at all times, and it can be specially commended at this season for the beauty of its abundant fruit. This fruit, though, as a rule, somewhat astringent, varies greatly in its edible quality, and we have lately received samples of it which had just enough of the Wild Cherry flavor to make it piquant. Some Beach plums sent to this office by Mr. Jackson Dawson, of the Arnold Arboretum, were dark purple, with a distinct bloom. Others received earlier were red, others still a clear amber-color, and all were quite as palatable as many cultivated fruits.

A correspondent of *The Country Gentleman* writes in an interesting way of a visit to a large farm in England where medicinal and aromatic herbs are cultivated. Henbane, Belladonna, Poppies, medicinal Rhubarb, and Aconite, are grown with Marigold for its tincture of calendula, Lavender for its perfume, Pansies for the oil of violets, and many more. The farm has its own laboratory for chemical work, but the writer thinks that if adjoining farms would unite to raise some of these herbs, a coöperative laboratory for getting the product into marketable form could be run in the same way as creameries now are.

The abundant clusters of lilac-pink fruit which are now seen on Callicarpa purpurea makes this a most interesting shrub. Since the flowers and fruit are borne from the axils of its opposite leaves, these clusters of twenty or thirty little berries are arranged regularly in pairs along the slender branches for a distance of two or three feet, and they are so numerous that the branches arch in a graceful way under their weight. The shrub is only two or three feet high and the flowers are inconspicuous. An American species, C. Americana, bears still more beautiful fruit, but it is not reliably hardy north of Washington.

The *Gardeners' Magazine* gives illustrations of two new single Pæony-flowers, one of which, Mikado, is a beautiful shade of reddish rose, with a soft rose-buff centre, while the other, named Margaret Atwood, is pure white, with a clear yellow centre. The flowers are said to have stouter and more substantial petals than those of most single Pæonies, so that they will stand well in water when cut. The varieties were introduced from Japan, and the Messrs. Wallace, of Colchester, who raised them, received an award of merit from the Royal Horticultural Society. We have always commended single Pæonies for their beauty both on the plant and when cut, and we cannot have too many good varieties.

Of the seventy odd thousand trees in the streets of Washington, D. C., fully five thousand were uprooted during the gale on Tuesday evening of last week, and of those remaining a very large proportion were very seriously injured. In the parks the damage done to the trees was equally severe, especially so among the fine specimens in the grounds of the Executive Mansion and in the Smithsonian grounds. It was impossible to get near the White House with a vehicle of any description on Wednesday morning, owing to the fallen trees. The Silver Maples are the worst sufferers, scarcely an uninjured tree of this species being left; the Ginkgoes, the Honey Locusts and the Elms stood the gale well. In the parks some lofty specimens of Libocedrus decurrens snapped off like pipe-stems, and on examination the wood was found to be perfectly sound. The greenhouse structures in the outskirts of the city were badly shattered, one firm suffering to the extent of ten thousand dollars.

There are many Orchids which are known only from descriptions published long ago, and very imperfect ones at that, so that it is not always easy to identify them. Stanhopea Warscewicziana was originally discovered on Mount Chiriqui, in Central America, and flowered in Berlin in 1852, and was soon after described under its present name. A figure was afterward published by Reichenbach, and then the plant appears to have been lost sight of. We learn from the *Orchid Review* that this Stanhopea has just flowered in the collection of J. B. Hodgson, Esq., Newcastle-on-Tyne, from a plant received from Costa Rica two or three years ago, and the reappearance of this long-lost species is a matter of some interest. Reichenbach's figure shows a flower of bright yellow, with the exception of the column, while that of Mr. Hodgson's plant is much lighter, though identical in structure, from which it appears that the species may be variable in this respect, although the figures in Reichenbach's work are often so badly colored that one cannot place too much reliance on them. The flowers have a strong aromatic perfume.

Marquis de Montmort is the Chrysanthemum most frequently seen in the florists' windows now, a comparatively new French flower, but not grown for cutting until last season, when it was first offered in this city on September 30th. The main supplies of early Chrysanthemums have been coming from Dailledouze Brothers, in Flatbush. These growers sent the earliest flowers of Marquis de Montmort this year on September 22d. They are a pleasing pink, not unlike Viviand Morel, and considered the best early Chrysanthemum of this color yet grown. The flowers are Japanese in type, of good size, and the stem and foliage are excellent. The plants are tall-growing, reaching five feet in height. A few blooms of the same variety came from P. H. Scudder, Glenhead, Long Island, on September 21st, a day earlier than the larger cutting made by Messrs. Dailledouze. The earliest Chrysanthemums of all in trade in this city were flowers of the small pink variety, Madame Marie Masse, which came from Messrs. Garrett & Rose, of Jersey City, on September 17th; these were followed on the succeeding day by flowers of Madame Gastellier, one of De Laux's introductions, a variety not unlike Madame Ferdinand Bergmann, and the earliest white Chrysanthemum. Lady Fitz Wigram, an English variety first seen here last season, has been in market since September 22d. The flowers are a clear white and of medium size. The plants are very dwarf growers and have the fault of setting buds too early. Varieties ready for cutting during the early part of the current week are the clear white Chinese Madame Ferdinand Bergmann, the substance of its petals giving it good keeping quality; the Japanese Merry Monarch, also white, and with larger flowers, and the well-known yellow, Marion Henderson. Yellow Queen, J. E. Lager and Harry L. Sunderbruch, all good yellow varieties, will be in flower by the close of this week. The season for early Chrysanthemums is nearly a fortnight in advance of last year.

The novelty in the fruit stores this week are the so-called winter cantaloupes, which can be had for thirty cents each. The variety on sale comes from Spain, and owing to its long-keeping qualities the melons endure the sea voyage very well and are offered in fair condition. They are green, egg-shaped, with a hard shell, of good flavor, and have the distinct odor of muskmelons. There are a number of varieties, some with salmon-colored flesh and some with green flesh and a solid interior like a cucumber. Those in the market now belong to the class known as White Antibes with a soft interior and loose seeds. English filberts, in their hulls, are already seen in the fruit stores. Gravenstein, King, Pound Sweet, Snow and Fall Pippin are rated highest of the apples now in market, though the abundant crop makes low prices for even the best of this fruit. Nearly 50,000 barrels were sent to wholesale dealers in this city during last week, and more than 200,000 barrels have been handled in the local trade since the first of September, against less than 83,000 barrels in the corresponding period of last year. California fruits are still coming east in large quantities, the heaviest shipments of the season to this city having been received during the week ending September 26th, when ninety-five car-loads came, and as many as fifty-seven car-loads were sold here during last week. Grapes and plums comprise the greater part of these receipts. Selected Seckel and Bartlett pears, from cold storage, command good prices; other pears now offered are Beurre Bosc, Sheldon, Beurre d'Anjou, Clairgeau, Louise Bonne, Comice, D'Alencon, Winter Nelis and Duchess. As many as 22,050 barrels of Jamaica oranges have already been sent to this city this season, and 1,000 boxes of this fruit were last week forwarded to England on special orders. A single cargo which arrived last week contained 601,000 cocoanuts. A further idea of the immense quantities of staple fruits consigned to this market may be had from the importations of bananas during September, which amounted to 376,875 bunches, and 1,750,000 boxes of lemons were imported during the past nine months.